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2 Big Sky

Clearwater

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Annual School Issue



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Annual school, exam in early October

THE 47th ANNUAL SCHOOL for Water and Wastewater Operators and Managers will be held Oct. 6-9 at the Student Union Building at MSU in Bozeman. An operator certification exam will be held Friday morning, Oct. 10, at the Student Union.

Dr. Aarne Vesilind of Duke University and Dr. Amid Amirtharajah of MSU will be the main speakers during this year's school. Dr. Vesilind, author of the textbook The Treatment and Disposal of Wastewater Sludges, will speak on "Methods of Sludge Management." Dr. Amirtharajah, one of the country's top authorities on water treatment, will present "An Overview of Water Treatment Processes."

Also featured at the school will be:

■ Dr. Horvath of the sludge-composting firm Eko-Kompost in Missoula;

■ Bob Butcher, water and wastewater process control manager for the City of Billings, who'll discuss the importance of chemical additives in the water-treatment process;

■ Kevin Gertig, Rocky Ford, Colo., who has researched extensively the various properties of lagoons;

■ and Leonard Pulkrabek, a drilling and well consultant from Fargo, N.D.

The school's purpose

The Water School is for both water and wastewater operators and for both large and small systems. One purpose of attending Water School is to get help in preparing to take the certification examination. But that is not the only purpose. The school hopes to produce more competent and knowledgeable operators.

The conventional system operator examinations are based upon the New York and Idaho manuals available for purchase from the Certification office or at the Water School. The New York water operators manual is \$2.50. The other three are all \$2.00 each. Operators of wells or lagoon systems will be supplied with free study material for their examinations.

PRELIMINARY SCHEDULE

Monday, Oct. 6

Morning - Joint Session

7:30-8:30	Registration
8:30-8:45	Welcome from MSU
8:45-9:00	Response from Dept. of Health & Environmental Sciences
9:00-9:30	Water and Wastewater Operator Certification: Why, Who, How
9:30-9:45	School Objectives -- distribution and explanation of study materials and exercises
9:45-10:15	Break

The Big Sky Clearwater is published quarterly by the Water Quality Bureau of the state Department of Health and Environmental Sciences for water and wastewater treatment operators in Montana.

Editor -- Charles Wood

Graphics -- Erich Weber

10:15-11:30 Public Relations and Communications
11:30-1:00 Lunch

Afternoon -- Joint Session

1:00-2:30 Water Treatment Processes (Amirtharajah)
2:30-3:00 Break
3:00-4:00 Water Treatment Processes (continued)
4:00-6:00 Operators' Study Session

Tuesday, Oct. 7

Morning Session I -- Small Wastewater Systems

8:00-10:00 Lagoons -- Physical, Chemical and Biological Indicators of
Pond Performance
10:00-10:30 Break
10:30-11:30 Oxidation Ditch Operation

Morning Session II -- Large Water Systems

Innovations in Water Plant Operations

8:00-8:40 The Billings Experience
8:40-9:20 The Butte Experience
9:20-10:00 The Great Falls Experience
10:00-10:30 Break
10:30-11:30 The Missoula Experience

Afternoon Session I -- Water Systems

1:00-2:00 Control of Iron in Drinking Water
2:00-2:45 Chemical Aspects of Water Treatment
2:45-3:00 Break
3:00-4:00 Chemical Aspects (continued)
4:00-4:30 Fluoridation Considerations
4:30-6:00 Operators' Study Session

Afternoon Session II -- Wastewater Systems

1:00-2:30 Microbiology of Wastewater
2:30-3:00 Break
3:00-4:30 Wastewater Collection Systems
4:30-6:00 Operators' Study Session

Wednesday, Oct. 8

Morning Session I -- Water Supply Plants

8:00-10:00 Well-Water Systems -- Construction, Operation, Maintenance,
Pumps, etc.
10:00-10:30 Break
10:30-11:30 Operating a Small Surface-Water System
11:30-1:00 Lunch

Morning Session II -- Wastewater Systems

Innovations in Wastewater Plant Operations

8:00-9:00 The Billings Experience
9:00-10:00 The Great Falls Experience
10:00-10:30 Break
10:30-11:00 The Havre Experience
11:00-11:30 The Livingston Experience

Afternoon Session I -- Water Distribution
1:00-1:45 Valves and Hydrants
1:45-2:30 Meters
2:30-3:00 Break
3:00-4:00 Cathodic Protection of Pipes
4:00-6:00 Operators' Study Session

Afternoon Session II -- Sludge Handling
1:00-2:30 Aerobic and Anaerobic Digestion
2:30-3:00 Break
3:00-4:00 Sludge Composting -- Eko-Kompost in Missoula
4:00-6:00 Operators' Study Session

Thursday, Oct. 9

Morning -- Joint Session
8:00-10:00 Methods of Sludge Management (Vesilind)
10:00-10:30 Break
10:30-11:30 Basic Electricity and Electrical Safety
11:30-12:30 Lunch

Afternoon -- Joint Session
12:30-1:30 Basic Instrumentation
1:30-2:15 Chlorination Safety
2:15-3:30 Trenching Safety
3:30-4:00 Awards Presentation
4:00 School officially closes
4:00-6:00 Operators' Study Session

Friday, Oct. 10

Morning
8:00-12:00 Operator Certification Exam

A scheduling switch for certification exams

EXAMINATIONS for Class 1, 2, and 3 operators are held in the spring and fall of each year. In the past, the fall examination has been held at four locations on the first Saturday of December. The four locations are: Missoula, Bozeman, Havre, and Miles City. The spring examination has been held in conjunction with the AWWA-WPCF convention and at one location only. The Certification Board has decided to switch the examination schedule this year. The fall examination is scheduled for October 10, 1980, 8 a.m. till noon, in Bozeman only. The spring examination will be held at a time yet to be scheduled at Missoula, Bozeman, Havre and Miles City simultaneously.

The rationale behind this change is that the December scheduling risked bad weather and bad roads and the October exami-

nation at Bozeman will make it possible for those attending Water School, many of whom wish to become certified, to take the examination without making a second trip at a later date.

The Certification Board wishes to stress that it is not a requirement to attend Water School in order to take the examination. What IS necessary is that certification application and appropriate fee be in our office not later than September 26, 1980. Those wishing to apply should obtain an application from Water Quality Bureau offices in Billings or Kalispell or by writing or calling our office at: Montana Board of Certification for Water/Wastewater Operators, Cogswell Building, Room A206, Helena, Montana 59601, Phone: 449-2691.

A strange new voice haunts Great Falls



Mysterious phone calls are cries for help!

IT IS NIGHT. Past midnight. You are floating in that wonderful land of not-yet-quite-asleep where your body is growing numb but your mind is still alert enough for you to enjoy it.

Suddenly, something loud and rude shakes your system into overdrive. You panic. Your body — still numb — is out of bed. For some reason — you don't know why — you stumble toward the telephone. You are confused, slightly frightened. You pick up the receiver. You are not quite there, but something strange and awful is on the other end of the line.

"Hello," you say, the word escaping from your coma without your help.

A voice crawls from the earpiece. An ominous voice. Evil. The monotone voice of a criminal. A nightstalker. An extraterrestrial beast.

"This is station zero-zero, fault two."

You struggle to comprehend.

"What?"

"This is station zero-zero, fault two."

It is a Russian spy trying to feed information to his contact but getting the

wrong number. It is HAL the Computer going berserk again and threatening to destroy your spaceship.

"Station. . . zero-zero. . . fault two."

"Station. . . zero-zero. . . fault two."

"Station. . . zero-zero. . . fault two."

The incessant message finally drives away the fog. It is no spy, no felon. It is not HAL the Computer. It is ADAS. And he's just calling for help.

To acknowledge, you press the touch-tone button on your phone.

"Bye," ADAS says curtly, and hangs up.

You feel kind of silly, but now you've got to get dressed and go give ADAS a hand.

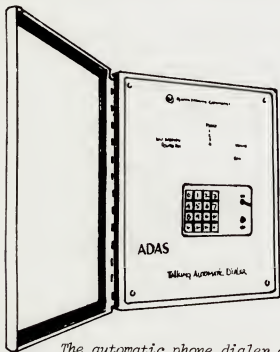
IN THAT mini-drama, you just played the part of the chief of operations of the Great Falls wastewater treatment plant. He has been awakened by ADAS II, the plant's new talking automatic dialer.

ADAS is a black box plugged into three vital functions at the plant. When something goes wrong — and nobody is there to correct it — ADAS gets on the phone and begins hunting for the right people. When

he connects with someone, his electronically programmed and synthesized voice explains what is going on in very terse terms.

ADAS — in the plant since last February — operates on a standard dial-up telephone line. It is capable of monitoring up to four alarm conditions at four stations (although 8-channel capacity is an available option). When a monitoring system senses trouble in the plant and any of its 24 pump stations, ADAS gets access to the phone line, waits for a dial tone, then dials up to 16 digits (oven long distance).

After dialing one of four telephone numbers, ADAS delivers his sinister-sounding message to whoever answers, indicating the two-digit station number and the fault status at that station. ADAS repeats the message 16 times. But the person at the



The automatic phone dialer at the Great Falls treatment plant.

other end can let ADAS know he's gotten the message by pressing the touch-tone key on his phone. Following the acknowledgement, ADAS says "Bye," hangs up and enters a 30-minute delay to allow time for corrective measures to be taken.

If no one answers the phone or acknowledges, ADAS hangs up, waits 60 seconds, then dials the next priority phone number.

ADAS is persistent. He'll keep

calling the four phone numbers until somebody comes to the rescue. Anytime ADAS receives an incoming call, he'll deliver a very brief status report to the caller ("Station eight-six clear" means things are operating smoothly at the plant, given the code number 86).

DAVE BROWN, plant manager, said the four persons in ADAS' little black book are (in this order): the plant's chief of operations, the chief of maintenance, the assistant plant manager, and plant manager Brown. You don't get too many calls when you're last on the list, Brown said.

Brown described the four conditions that ADAS keeps a finger on in Great Falls:

Station One is a timer the operator must reset within two hours to show he hasn't been injured somewhere in the plant. "This made for a lot of phone calls (from ADAS) at first because the operators would forget to reset the timer," Brown said. Calling it "strictly a safety function," Brown said he's thinking about getting the operators a radio-control device to help them reset the timer from anywhere in the plant.

Station Two monitors plant power, letting someone know when an outage occurs, such as one that happened during a storm in May. ADAS has his own battery pack.

Station Three is hooked into the lift-station alarm. "Lift stations overflowed a couple of times," said Brown, "and we were able to respond 30 minutes earlier than we would have in the past." ADAS, in this case, helped catch the problem before there was any damage.

Station Four "we haven't done anything with," Brown said. But he's thinking about plugging it into the plant's heat-treatment system.

At any of these stations, ADAS can report up to four "faults." Fault Number 4 — most serious — forces ADAS to call all four phone numbers, no matter who answers, and all four plant officials "come running," Brown said.

Brown said ADAS has been quite reliable. Only one major gliche has occurred: wave-action sometimes bumps the high-water alarm without setting it off continuously. "But it confuses the hell out of the machine (ADAS)," Brown said. "It

calls us up and gives us all 16 faults, so we're totally confused, too."

But now the plant officials know what's happening when ADAS "goes ape." And they know, too, what is speaking when they hear an eerie voice in the night.

Lift-station inspections demand use of your senses

From Digester magazine
Illinois EPA

IT IS OFTEN NECESSARY to construct lift stations to pump the wastewater to the treatment plant. The importance of lift stations to the treatment process is obvious, and therefore they should be checked daily, and completely examined at least once per week. An operator should use all his senses when checking a lift station: sight, hearing, touch, and smell. Some of the major items which need to be inspected at the lift station are:

- | | |
|---------------|---|
| Pumps | Check for vibration, heat and noise which would signify problems. CAUTION: BE CAREFUL OF MOVING PARTS. You have to feel the pump to check for a bearing overheating. Check the packing gland — a small amount of water should always be discharging. The packing gland can be tightened or loosened by the two nuts on the lantern ring, unless the packing is worn out. |
| Controls | At each inspection, the pumps should be turned on "hand" to observe their operation, then switched back on automatic. Weekly, the pumps should be on "hand" until the level in the wet well is drawn down to the pumps' intake lines to clean out accumulations of debris. If the lift station has timers or counters, check that both pumps are operating on equal amount. The floats or bubbler lines should be inspected quarterly, or as needed, for wear. Grease and rags accumulating in the wet well need to be removed depending on local conditions. |
| Sump pump | Check for proper operation at each inspection by lifting the float. Clean the sump pit of debris as needed. |
| Dehumidifier | Check for proper operation at each inspection. The dehumidifier removes moisture from the air which could cause rust problems and problems with the electric controls. |
| Standby power | Operate the standby power weekly and observe the gauges. SHUT OFF standby power before working on pumps or electric controls. |

Ventilation

Check before entering the lift station every time. Also inspect as needed the check valves, ladder rungs, lights, alarms and paint condition. Lubrication should be done in strict accordance with the recommendations of the manufacturer.

Spare parts

Packing, fuses, electric tape, bearings, bulbs, belts, mechanical seals and gasket material.

Bring your tools with you each time you make the inspection rounds just in case they are needed. Remember, preventive maintenance is a lot less costly than early replacement.

Floodwaters wreck treatment plant at Kerr Dam

THE SEWAGE TREATMENT PLANT at the Kerr Dam community, just south of Flathead Lake, is back in operation after it was knocked out for more than a month by floodwaters.

On the night of June 12, the area around Kerr Dam received 3 inches of rain in 24 hours. More than one inch of this deluge fell in less than one hour. That's a monumental amount for Flathead Valley, which in the past 5 years has had an annual rainfall of only 15 inches.

The residents of the Kerr Dam community, which sits in the Flathead River canyon bottom, discovered they are living in what had become an overflow channel for the usual stormwater drainage route off the plateau to the south. Water and soil debris overflowed out of the nearby gulch, raced through the housing, across roads, lawns and gardens and discharged into the river at a point which had been chosen as the location for a small package treatment plant.

Buried controls to the Kerr Dam power plant were extensively damaged and the sewage treatment plant was completely flooded, filled with rocks and silt, and put out of business. It was determined that the damage was less than it first appeared, but the treatment plant was not back into acceptable operation until July 22. Part of the lag was caused by another smaller flood, during a half-inch rain on July 14, which took advantage of the newly-scoured drainage route and redeposited silt in the clarifiers.

To get the plant back into service, the plant housing -- which had been knocked off its foundation -- had to be rebuilt and the plant was sandblasted and repainted.

But one final snag occurred. Someone suggested using septic tank sludge to get the plant going. That was good for a three-week upset.



Treatment plant housing sits a tilt off its foundation after flood near Kerr Dam last June.

Helena, too, to abandon stinking system

H ELENA CITY COMMISSIONERS have decided to abandon the city's present method of treating sewage and go to a different, hopefully less smelly system.

Commissioners committed themselves to the design phase of an anaerobic digester, which will cost an estimated \$2.3 million, to replace Helena's Purifax unit. The next step, approval of construction, is still a year off and completion would be scheduled for May 1983.

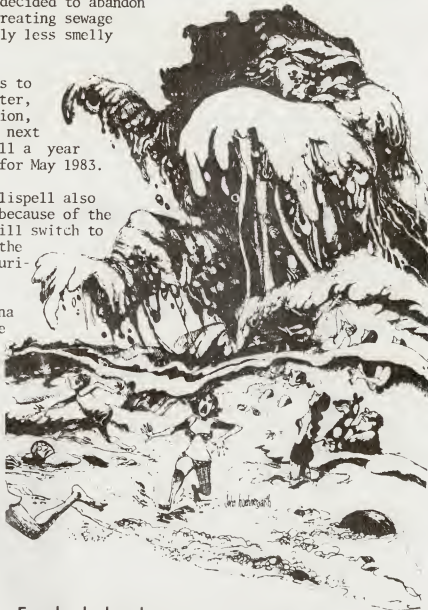
Earlier this year, the City of Kalispell also decided to abandon its Purifax system because of the same odor problems. Kalispell, too, will switch to a digester. Helena and Kalispell are the only two cities in Montana using the Purifax system.

How much federal funding the Helena project will receive is not clear. The Environmental Protection Agency generally funds 75 percent of sewage treatment projects, but officials may exact a price for the funds already invested in the Purifax system. The City of Helena, in turn, has filed suit against the makers of the Purifax system for \$400,000.

Dave Ashley, acting city manager, explained that officials may consider some of the cost of the Purifax system "wasted" since the system is being abandoned before the end of its life. However, the Water Quality Bureau, which administers the Construction Grants Program, has recommended that the Capital City abandon the Purifax system and Ashley is optimistic that the city will get the full amount of funding.

The digester is just one part of a package of sewage improvements that the commission approved. The package, which also includes improvements for handling liquids and rehabilitation work on the drain system, totals \$3 million.

Under the new plan, the city would inject the treated sewage into fields for use as fertilizer. But during the winter, when the ground is frozen, the sewage would be put into drying beds in thin layers and



**Fresh sludge becomes a monster
at both Helena and Kalispell**

then removed and buried in the spring. Until the plant is complete, the city would have to return to the Purifax system each winter.

Commissioner Jim Nybo asked if the beds would continue to stink in the summer months, until the new system is instituted. "It just makes me sick to think about another summer with that smell," he said.

Dick Nisbet, Helena's director of pub-

lic utilities, noted that the drying beds should be emptied in the spring or early summer, since the city will start injecting the sludge as soon as the ground thaws. "We didn't get the complaints this year until it started getting warm the last 45 days," he said at the July 14 commission meeting.

Under the prodding from commissioners, Nisbet predicted that by Oct. 1, the offensive odors from the Helena sewage plant should be gone. But they could be back again briefly next spring since the city will have to use the Purifax method during the winter.

Both Helena and Kalispell have begun injecting raw sewage into the ground as an interim solution to their odor problems.

City and state officials agree that the most disagreeable smells come from fresh sludge.

The Helena city commissioners, who already have suffered through numerous problems with the Purifax system, carefully questioned city officials and consultants on the new system and how it would work. "Will we be assured we're settling the problem -- are we going to be 100 percent free of odor -- or are we moving toward a second lawsuit?" asked Mayor Rich Brown.

Jim Henson, a consultant with Black and Veatch of Kansas City, told the commission that no plant design can guarantee that there will be no odor, but that under normal conditions, most plants don't have odors.

MWPCA needs help with operator-award process

The Water Pollution Control Federation has several national competitions for recognition of waste treatment system operators. To find Montanans who may be eligible to enter the national competitions and to recognize individuals doing an outstanding job in the wastewater-treatment field in our state, the Montana Water Pollution Control Association is developing a selection process to choose one or more outstanding wastewater system operators.

The individual(s) so selected will be recognized at the joint MAWWA/MWPCA meeting in Butte next spring.

The Awards Committee is seeking your thoughts and comments, both pro and con, on what criteria you feel the persons selected for honors by the association should meet, what "reward" they should receive, and much more.

The following is a questionnaire to start you thinking:

- | | |
|----------------|--|
| Yes ___ No ___ | (1) Should we have provisions for more than one award each year? |
| Yes ___ No ___ | (2) If you answered "Yes" above, would you like to see Montana communities divided by size with awards given at more than one level? |
| Yes ___ No ___ | (3) Should we give publicity to <u>all</u> finalists so others than the first-place winners get some recognition? |
| Yes ___ No ___ | (4) Should the persons judged to have come in second or third automatically be included in the following year's competition? |

- Yes ___ No ___ (5) Should we consider management-level personnel as "operators" for the purpose of these awards?
- Yes ___ No ___ (6) Should certification by the state as a water and wastewater operator be a requirement?
- Yes ___ No ___ (7) Should current association with a Montana municipal or industrial waste treatment system be required?
- (8) How should we recognize and reward the winner(s)? (Please remember that we have only a modest amount to spend in this regard.) Suggestions so far include a plaque, certificate, paid registration to the MWPCA convention, and paid-up dues in WPCF for one year.
- (9) What facets of a person's activities on the job make that person outstanding and worthy of consideration for this award? What weight should be given to these various elements (show by percentages):
- ___% (a) display of ingenuity in approaches to the solution of wastewater system problems -- judging to be based on specific examples;
 - ___% (b) capacity and interest in self-education to make the person a better employee;
 - ___% (c) devotion to duty above that generally expected;
 - ___% (d) a sense of public relations;
 - ___% (e) community-support or service activities outside of the wastewater system;
 - ___% (f) neatness and orderliness in thought and action as shown by records kept and the condition of the work area and equipment under the individual's control;
 - ___% (g) capacity for growth in job stature -- willingness to accept additional responsibility when offered;
 - ___% (h) interest in "professional development" (for example, membership in WPCF and activity in MWPCA);
 - ___% (i) length of service.

The Awards Committee feels a lot of additional thought and organization must go into this outstanding-operator selection and recognition. Please communicate your suggestions on this subject, or mail the completed questionnaire, to:

David McCullough, chairman
 MWPCA Awards Committee
 c/o HKM Associates
 P.O. Box 31318
 Billings, MT 59107

A death brings changes at Glendive water plant

THE RECARBONATION UNIT at the Glendive water plant was supposed to generate CO₂. It had for 20 years.

Sometime late at night on October 14, 1979, or early on October 15, something went wrong. The unit stopped generating carbon dioxide and began generating CO — carbon monoxide. A change in a chemical symbol killed water plant operator Richard Brown.

Brown, 26, died between 10 p.m., when he shut down the plant, and 6 a.m., when his body was found near the generator. The ventilation fan in the recarbonation unit was not running.

Chuck Mohr, water plant supervisor, attributes Brown's death to two factors: the malfunctioning CO₂ generator — at the plant since 1960 — and the idle vent fan. Mohr didn't go so far as to call it a "freak accident," but he suggested there was no way to know such an accident could occur.

"The industrial-safety inspector, who was here just after the accident, said he would have given our plant a clean bill

At first, the people at the scene of the accident were baffled by the cause. But Mohr soon had some clues. When Brown came on duty at 3 p.m. October 14, the ventilation fan was running. When his body was found, the fan was unplugged. "A monitor showed us that CO was present in the unit, but not at a fatal dose when the fan was running," Mohr said. "So I turned the fan off again, and the inspector and I went off for coffee. When we came back, the CO monitor's meter had peaked."

Carbon monoxide is fatal when the concentration reaches around 150 parts per million. An autopsy showed a dose of about 180 ppm in Brown's blood.

MOHr IS DOUBLY distressed knowing that the death might have been averted if a basic safety rule had not been broken — use a ventilator at all times that the equipment is running.

"I've been at this plant for 15 years," Mohr exclaimed. "And I've always



of health before the accident," Mohr said. "The inspector said there's never been a recorded fatality from a malfunctioning recarbonation unit." Therefore, inspectors don't look for such things.

Recarbonation units put carbon dioxide into water as a "conditioning agent" before the water enters the distribution system. Glendive has an Infilco CO₂ Generator — powered by natural gas — which is the only one of its kind in the state. Other units around Montana create CO₂ in water by mixing powdered chemicals, not generating gas.

stressed turning on the fan." He said he was planning, before the accident, to have an electrician wire the fan to the generator's on-off switch so it would always be running when the recarb was on. "We just never got the job done," he said.

So what happens now?

Mohr said the Infilco company is overhauling the 20-year-old recarbonation unit, which has been shut down since the accident. Consulting engineers are drawing up plans to isolate the recarb basin by sealing it off with special baffles and to

provide better ventilation. The unit will also get a continuous CO monitor that will sound an alarm when CO reaches 50 ppm.

And there's one final modification, Mohr said. "From now on, you won't be able to turn on the recarb unit unless the vent fan is on."

Your guardian angel takes vacations, too

By Lewis F. Beer
former water plant operator
for Yellowstone National Park

Labor Day. Flags snap-cracking in the breeze. Majorettes leading bands. Duffers following golf balls. Highways filled with vehicles, especially campers and trailers. Fishermen battling mosquitoes. Sunbathers roasting themselves on beaches. Horseshoes clanging against stakes.

Holidays in America are spelled F-U-N. And Americans say, "It is our heritage, we have a right to have fun."

I'm not knocking it. But I'd like to report on another American tradition that's just as important. That's the tradition of the American workplace, equally taken for granted: the 8 a.m. punch-in, the 10 a.m. coffee break (ditto for 2 p.m.), lunch at 12, and the clock-watcher's happiest hour -- 5 p.m. Again, both fun and work are taken-for-granted "rights." But, this being an imperfect world, there are dangers lurking behind both fun AND work, dangers many of us choose to ignore.

Sometimes we throw our belief in a "right to life" out the window after an accident occurs. We say "It's bad luck" or "His number came up." We seek rational explanations for why the accident occurred, often without first having considered how it could have been prevented.

Safe working conditions and safe working habits are not necessarily an American "tradition" -- we do have a right to them but we should not be assuming they will exist without our efforts. Safety has to be worked on constantly, practiced, polished, and shined. Unsafe conditions must be sought after continuously. And they should be corrected -- and I don't mean corrected by the mere writing of a memo.

In the water and wastewater field, we

have an occupation that's rated the second highest in injuries and fatalities (hard-rock miners are Number One). Too many operators, supervisors and officials tend to be lax, feeling that guardian angels are paying special attention to their plants, forgetting that guardian angels take vacations, too.

Unfortunately, when budget cuts are made, the first items to go seem to be items related to safety.

Anyone saying, "We have no unsafe conditions or unsafe habits here," could be wrong. Dead wrong.

Voila! Washing machine turned into a sampler

A Cedar City, Utah, wastewater treatment plant superintendent has devised a novel way of collecting samples. J. Vernile Terry has removed the timer and the vacuum pump from an old washing machine and made an automatic sampler.

Terry reports that this method works so well that he anticipates making several more. And you can't beat the cost. It's free.

With the timer and vacuum pump of the washing machine, he can select any time period and collect as many or as few samples as needed. Terry told the Big Sky Clearwater, "You can sample just about everything except for raw influent, which plugs up the device. It can take a sample every 30 minutes if you wish."

Terry has some plans printed up showing how it works. You can call him at (801) 586-8524, or write: J. Vernile Terry, Cedar City Wastewater Treatment Plant, 43 North 300 West, Cedar City, Utah 84720.



\$27.5 million in wastewater-improvement projects

Wastewater collection and treatment improvements are under way or have been accomplished in the following Montana cities under the Construction Grants Program:

Butte

Butte-Silver Bow County has completed a \$2.2 million sludge-injection system. Sludge is pumped from an aerobic digestion system at the plant in Butte to a storage lagoon seven miles away. From the lagoon, it is pumped to a special tractor which injects the sludge into the soil.

Chinook

A grant has been approved for design and construction of a new activated-sludge plant, to be located outside the city, and a sanitary sewer collection system for North Chinook. The cost of the project is \$1.8 million.

Gildford

A complete new collection system is planned for Gildford, along with a complete retention lagoon system. The \$687,000 project has been approved for design and construction.

Hardin

A new oxidation-ditch wastewater-treatment facility was started up recently in Hardin. The \$1.1 million project replaced a failing lagoon system.

Bozeman

Approval has been given to begin design on upgrading the Bozeman wastewater treatment plant. The upgrading will include an expansion of the activated-sludge system and construction of percolation beds for ammonia conversion. Approximate cost of the project is \$9 million.

Columbia Falls

A grant has been awarded for design and construction of a new extended-aeration treatment plant. The design will in-

clude aerobic digestion and land-application of sludge. The \$2.1 million project will allow the flexibility of future expansion as the population increases.

East Helena

A \$750,000 project has been approved for design and construction of an aerated lagoon system. The system will be located adjacent to the existing system and will provide more effective wastewater treatment and reduced odor problems.

Eureka

Approval has been given for construction of an aerated lagoon system to replace the existing overloaded facility. The \$900,000 project includes the land-application of the effluent for crop irrigation.

Livingston

Bids have been opened for construction of a new wastewater treatment system that incorporates rotating biological contactors. The \$2.8 million project will upgrade the existing plant to secondary treatment.

Willow Creek

Plans have been approved for design and construction of a collection system and package treatment plant to replace existing septic tanks and do away with an untreated sewage discharge. The \$305,000 system will discharge treated wastewater into an existing irrigation ditch.

Forsyth

A new oxidation ditch is operating in Forsyth. The \$1.2 million project replaced a lagoon system designed for 800 people. The town expects to have a population of 5,000 by 1990.

Broadus

Construction has begun on the third cell of a lagoon system for the town. The third cell will be the same size as the two existing cells. The \$180,000 expansion will



Certified laboratories

allow greater capacity and flexibility in treating the town's wastewater.

Miles City

The Haynes Avenue sewer interceptor line is nearly completed. So is work at Miles City's two parallel oxidation ditches which will be able to serve a population of 18,000. Total cost of the interceptor and ditches is \$4.2 million.

Sidney

New wastewater interceptors and improvements to the existing treatment facility are planned. The \$1.3 million project will include removal of two problem lift stations.

3 chlorination workshops

Three chlorination workshops have been scheduled for eastern Montana cities in September.

Sponsored by AWWA, WPCA and the Water Quality Bureau, the workshops are scheduled for Wolf Point, September 9; Miles City, September 10; and Billings, September 11. The workshops will cover chlorination practices, chlorine reactions in water, dosages and residuals, safety, equipment, and breakdown and repair of chlorinators.

For further information, call Denise Osterman at 449-2406 in Helena or Dayton Alsaker at 252-5697 in Billings.

Colstrip needs an operator

Western Energy Company at Colstrip, Montana, has an opening for a water treatment plant operator. The company says applicants should have extensive experience with sand and diatomaceous earth filters and clarifiers. The company promises an excellent salary and benefits package.

Resumes should be sent to Jack Ervin, employment supervisor, Box 275, Colstrip, Montana 59323.

The Big Sky Clearwater will provide, as a regular feature, an updated list of Montana laboratories certified to carry out various kinds of water analyses, including microbiological and chemical.

The following is a list of the labs that hold an interim certification to do microbiological analyses on potable water. Because of new state regulations, these labs will have to be recertified by the Department of Health and Environmental Sciences in December.

MONTANA ENVIRONMENTAL LABORATORY
Room 217, M&M Building
Kalispell 59901

MONTANA TESTING
P.O. Box 6728
Great Falls 59403

CITY-COUNTY HEALTH DEPARTMENT
1130 17th Avenue South
Great Falls 59405

CENTRAL MONTANA HEALTH DISTRICT
P.O. Box 1150
Lewistown 59457

SAINT JOSEPH'S HOSPITAL
Polson 59860

MONTANA COLLEGE OF MINERAL SCI. & TECH.
Dept. of Biological Sciences
Butte 59701

MISSOULA CITY-COUNTY HEALTH DEPARTMENT
301 West Alder
Missoula 59801

CITY OF GREAT FALLS WATER PLANT
Quality Control Laboratory
P.O. Box 1609
Great Falls 59401
(Does not run tests for the public)

LIVESTOCK DIAGNOSTIC LABORATORY
Montana State University
Box 394
Bozeman 59715

NORTHERN TESTING LABORATORIES
P.O. Box 30615
Billings 59107

ST. JAMES COMMUNITY HOSPITAL LABORATORY
400 South Clark
Butte 59701

PUBLIC UTILITIES LABORATORY
P.O. Box 30958
Billings 59101

AMATEC, Bob Davidson
Plaza West Professional Bldg.
Level 1
1537 Avenue D
Billings 59102

Ohio lab is sponsoring quality-control program

The Environmental Monitoring and Support Laboratory (EMSL) in Cincinnati, Ohio, sponsors a quality-control program to assist government, private and industrial laboratories in their internal quality-control efforts. The services offered by this program are free of charge and participation eligibility is limited to those labs involved in chemical, biological and microbiological analyses for pollution control or safe drinking water monitoring.

After you submit a request card, the EMSL will send you ampules containing a known concentration of one or several chemical constituents. The EMSL has a limited supply of the following groups; therefore, the intention of this service is to provide requesting laboratories, on an infrequent basis, with an outside standard reference to be used in checking internal standard references.

To obtain a request card, write or call:

Juanita Hillman
Quality Assurance Coordinator
U.S.E.P.A.
Lincoln Tower Bldg., Suite 900
Denver, CO 80295
Phone: (303) 837-4935

The following are parameter groups presently available from EMSL for water pollution type samples:

Nutrients -

ammonia, nitrate, Kjeldahl nitrogen, orthophosphate, total phosphate;

Minerals -

pH, alkalinity, conductance, total hardness, total dissolved solids, sulfate, chloride, calcium, magnesium, sodium, potassium, fluoride;

NTA -

nitrotriacetic acid;

LAS -

linear alkylate sulfonate;

Trace Metals -

aluminum, arsenic, beryllium, cadmium, chromium, cobalt, copper, iron, lead, manganese, mercury (both inorganic and organic forms), nickel, selenium, vanadium, zinc, (three concentration levels of each metal);

Demand -

Biochemical oxygen demand (BOD₅), chemical oxygen demand (COD), and total organic carbon (TOC);

Mercury -

inorganic and organic forms (three concentration levels);

Volatile Organics -

1,2 dichloroethane, chloroform, 1,1,1 trichloroethane, 1,1,2 trichloroethylene, carbontetrachloride, 1,1,2,2 tetrachloroethylene, bromodichloromethane, dibromochloromethane, and bromoform;

Petroleum Hydrocarbons -

two crude oils, #2 fuel oil and Bunker C (for characterization);

Chlorophyll -

a,b,c and pheophytin for fluorometric analyses or spectrophotometric analyses (please specify the method to be used);

Polychlorobiphenyls (PCBs) -

aroclor 1254 and 1016;

Suspended Solids -

3 types: fine (particle size less than 45 microns, specific gravity 2.3), fibrous (fiber length 0.5 mm, specific gravity 1.52), and coarse (particle size

less than 150 microns, specific gravity 1.6).

The following types of samples are available to laboratories for analyzing safe drinking water monitoring samples:

Trace Metals -
arsenic, barium, cadmium, chromium,
lead, mercury, selenium;

Nitrate/Fluoride;

Pesticides -
Endrin, Lindane, Methoxychlor, Toxaphene;

Herbicides -
2,4D and 2,4,5-TP (silver);

Trihalomethanes.

A misplaced confrontation:

The ecological need for wise technology

The following is a speech by Douglas M. Costle, administrator of the Environmental Protection Agency, to a conference of the Association of Metropolitan Sewerage Agencies on April 29 in Nashville, Tenn.

LAST WEEK, as you know, Americans in about a thousand cities and towns celebrated the 10th anniversary of the first Earth Day. In connection with that observance, I fell to musing one night about its impact -- not so much on our air and water, the things I should be thinking about, but on our vocabulary.

Ten years ago, for example, I doubt that one American in 500 knew what "ecology" meant. If pressed to define it, I suspect many Americans would have guessed it had something to do with where you go after graduating from high school. Some others might have ventured that it was a civil right; inasmuch as all Americans are equal under our laws, all of them -- regardless of race, creed, color or sex -- have a right to ecology of opportunity.

Today, by contrast, probably one in three of us knows what "ecology" means.

Or, at least, we think we do. The word "ecology" has a precise meaning. It refers to an intellectual discipline that is one branch of the physical sciences, in exactly the same sense as are physics and chemistry. But most Americans use "ecology" as a synonym for "environment." We

must, they believe, "clean up our ecology." This is roughly equivalent to arguing that, before expanding the use of nuclear power, we must protect our physics...or, in another sphere, that precinct captains are vital to our political science.

There is no harm in such imprecision. Whether they use the word properly or not, most Americans are aware, in a general way, of the relationship between themselves and their habitat...and they want their home cleaned up. Congress and various administrations have translated that desire into laws, and these laws retain broad public support.

But there is harm in the imprecise use of the term "ecology" by both the most militant advocates of environmental protection, and its most militant opponents. In a paradoxical way, bitter as these two groups can be toward each other, their definitions of "ecology" go full circle and meet in common agreement.

To some executives in industry, for example, "ecology" means environmental impact statements, protesters being hauled away from nuclear plants, and endless litigation against industrial projects by the

Friends of the Racoon. And to some environmentalists, "ecology" seems to mean a passionate desire to make America a place where the deer and the antelope roam, and no factory ever rears its ugly smokestack. They agree on only one thing: the ecology and technology are opposed to each other.

The result, on one side, is that a considerable amount of corporate ingenuity is devoted to circumventing environmental regulation, rather than seeking better, more efficient ways to comply with it; and on the other, that a considerable amount of environmental rhetoric is directed at the managers, engineers, and producers who are our best hope for resolving our environmental problems.

LET ME PAUSE HERE and emphasize that this is not a hymn of praise for American industry. Left to its own devices -- left only to regulation by the market system, with no intervention by our political system -- industry would have pursued its damaging ways, and presented us with a nation vastly more polluted than it is now. And our political system would not have been moved to act without pressure from those early environmentalists who were invariably regarded as kooks and radicals. That first Earth Day was labeled "subversive" by the Daughters of the American Revolution, and its dangerous goings-on were closely monitored by the FBI.

You people are caught right in the middle of this dispute. You deal in technology -- but you apply it to ecology. You symbolize what we need: a marriage between these two ologies. For the fact is, that we cannot solve some of our most pressing ecological problems without technology.

Energy, for example, is probably our greatest single environmental and economic problem. Its production and combustion present hazards to our waters, our fishery resources, our air quality, and -- in the form of acid rain -- to the productivity of forests and soil. The increase in atmospheric CO₂, many scientists believe, could result in a disastrous elevation of temperatures around the globe.

There is no question in my mind that energy conservation in this and other developed countries is our best, cheapest,

and most quickly available "source" of energy. But there is also no question that -- though conservation must become a way of life in a crowded, resource-limited world -- we must also develop new sources to replace our dwindling stock of petroleum. Developing those sources will require the most skillful applications of technology. For example:

- THE PHOTOVOLTAIC CELL, which transforms sunlight into electrical current, is not yet economically competitive with traditional methods of generating electricity. However, it is rapidly becoming more so. When these cells were first employed, mainly on space satellites, they produced electricity at the rate of \$1 million per peak kilowatt. Today, the cost is down to about \$6,000. It will be competitive when we further reduce that cost to \$1,000. In order to do that, we need a breakthrough in the technology of producing and processing silicon...and in the technologies of energy storage.
- THE MUNICIPAL REFUSE that we now dump in landfills and burn in incinerators contains a tremendous amount of energy -- enough to meet the lighting needs of every residential and commercial building in the country. Yet today, we make use of but 1 percent of that energy. To substantially better that record, we will need to improve current technologies, in addition to overcoming political and institutional barriers to resource recovery.
- THE ENERGY POTENTIAL of crop and forest wastes is more massive yet: by one recent estimate, forest wastes alone could supply seven to eight percent of the nation's energy needs. Yet to harness more than a fraction of that potential will require a series of technological breakthroughs. Identifying new enzymes to speed the breakdown of cellulose, for example, could substantially cut the costs of producing methanol from these wastes; and inventing better methods for distilling the fuel would likewise add to its economic attractiveness.

YOUR OWN INDUSTRY is another in which we must rely on technology to help us resolve ecological pro-

blems. Among the specific tasks that might be cited are these:

- THE PROBLEM OF DISPOSING of sludge from wastewater treatment would be vastly simplified if we could apply more of the material to farmland -- and thereby reclaim its value as a plant nutrient. However, this requires removing some of the water, as well as the small quantities of toxic substances often found in the sludge. With current technology, it can be done, but it's a cumbersome and expensive process. Here again, simpler and cheaper technologies are needed.
- SMALL COMMUNITIES today cannot afford the systems that would safeguard their water supplies from a variety of contaminants -- especially the toxic substances that pose a long-term risk of cancer, genetic mutation, and a range of other health impacts. Thus there is an urgent need for inexpensive technologies that fit the budgets of our smaller towns.
- THIS COUNTRY GENERATES roughly 50 million tons of hazardous waste each year. Much of that will have to be disposed of in landfills or impoundments. But certain constituents of hazardous waste such as PCBs -- retain their toxicity for literally centuries. Thus we need technologies that will make disposal sites secure for at least several human generations.

This would be a tough agenda to handle even in economically easy times. It is vastly more so in a period of high inflation and budget constraints -- a time when we find it difficult enough simply to maintain business as usual, let alone take on new assignments. I say "we" because EPA and your (sewerage) industry are partners in this vast enterprise of restoring American waters to a desirable condition. Let me close, therefore, with some observations on the job facing us for the next decade.

In all environmental areas, but especially in water treatment, the 1970s were an era of legislative response and innovation. Congress, prodded by the people, handed us the enormous task of bringing our lakes, rivers and streams to "fishable and swimmable" condition by 1983.

The nation also gave us a considerable amount of resources for that job: the construction grants program remains the largest, non-military public construction program in the country.

But now, it appears, Congress underestimated the size of the job it handed us. Or, more accurately, we all did. Even if we could somehow enforce a stable budgeting situation -- one with a guaranteed construction funding rate of \$4 billion a year and 7 percent inflation, as opposed to the 13 percent current in the water-treatment industry -- it would still take 41 years to complete a \$53 billion program of meeting enforceable requirements for public-owned treatment works.

Needs vastly exceed even that sum. The compliance rate of public-owned treatment works with municipal-discharge requirements is an unacceptably low 40 percent. It would take \$15 billion alone just to bring 106 metropolitan areas up to secondary treatment. Overall, the states and EPA estimate that needs for building, repairing, or expanding municipal wastewater treatment facilities between now and the turn of the century will approximate \$106 billion. An additional \$62 billion would be needed to control stormwater runoff.

ARE WE LIKELY to receive such amounts? I doubt it. The more likely prospect is that these needs will outlive us all. Instead of simply longing for more bricks and better straw, we shall simply have to make better bricks out of the straw we have.

On the part of EPA, that will call for administrative creativity. We must refine the programs that were created in the last decade -- and beyond. With specific regard to the construction grants program, that means concentrating our funds where they are likely to have the greatest environmental payoff -- a strategy that will, in the tired but nonetheless useful phrase -- give us more bang for the buck. In search of that bigger bang, we are considering these possibilities:

- RE-WEIGHTING the allocation formula in favor of treatment needs in the larger metropolitan areas. At the present,

the formula for distributing money keeps funds from going where they are needed most: states with good projects ready to go cannot move because they have exhausted their allocations; and states without good projects tie up funds because of their lack of preparedness. In this regard, we will be listening very closely to ideas that will undoubtedly be forwarded by members of Congress.

- WE ARE ALSO LOOKING at user charges. The prospect of 75 percent federal money -- often augmented with 15 percent state money -- has seduced many



Douglas Costle: "We need to make the impossible possible."

a mayor into chipping in 10 percent for a super-duper treatment plant. Only afterwards does he or she learn that annual operation and maintenance costs can run 10 percent of construction costs. Thus the construction grants program has led many a well-meaning municipal official into buying an expensive white elephant. Clearly, some kind of stable financial base is required to make these plants operate with the economic as well as environmental efficiency designed into them. But today, only 3,000 communities throughout the U.S. have user-charge systems in place.

- THE SAME OBSERVATIONS about user-charges apply to industrial cost recovery. Suffice it to say that we regard the lack of industrial cost recovery as a preferential subsidy to industries discharging into publicly-owned treatment systems.

THESE ARE SOME of the items we are considering in putting together a long-term strategy for the construction grants program. We will not, of course, make any final decisions without extensive consultations among all our constituencies -- you and Congress included. Though EPA is a young and still-green agency as federal agencies go, we have picked up a few lessons in the 10 years of our existence -- and we are not eager to make a kamikaze attack that will end in a glorious, but futile, burst of flame.

But we have got to have some help from you, too. We badly need some managerial and conceptual innovations from you that will enable us to meet our environmental mandate without imposing impossible financial demands on our country. We vastly need fresh thinking about all the things I've mentioned: better waste technologies, resource recovery, methods of financing O&M...and, above all, making limited funds do more than routine duty.

Such calls for technological innovation are common, and are easily dismissed as being unrealistic. Yet the history of technology is full of achievements that sages predicted would never come to pass.

In 1900, for example, the Literary Digest -- once the most influential publication in the U.S. -- had this to say about the automobile: "Although its price will probably fall in the future, it will never, of course, come into as common use as the bicycle."

The day before the Wright Brothers took off at Kitty Hawk, a Harvard professor of physics called a press conference to explain why it was flatly impossible for man to fly.

In 1926, electronics pioneer Lee DeForest offered this opinion on the future of commercial television: "While theoret

ically and technically television may be feasible, commercially and financially I consider it an impossibility, a development of which we need waste little time dreaming."

And in 1945, Admiral William Leahy gave this advice to President Harry Truman about the atomic bomb: "That is the biggest fool thing we have ever done...The bomb will never go off, and I speak as an expert in explosives."

In short, a striking number of impos-

sible things have somehow gotten done over the years by people who refused to stop trying.

We look to your industry to add one more "impossible" achievement to this list. The technology that has given us so many ecological problems must now be applied to prevent them. You must show us how to merge two ologies that have often been in conflict into a single, life-sustaining, resource-conserving science for the environment.

Operators' Certification Corner

SAMPLE CERTIFICATION TEST QUESTIONS

1. If the flow through a water treatment plant is 300,000 gallons per day and a dosage of 2 mg/l of chemicals is applied, how many pounds of chemical will be used in 30 days?
 - a. 100 lbs.
 - b. 150 lbs.
 - c. 175 lbs.
 - d. 200 lbs.
 - e. 250 lbs.
2. A pump may be damaged if it is started with the discharge valve closed if the pump is
 - a. a positive-displacement pump
 - b. a turbine pump
 - c. a centrifugal pump
 - d. an axial-flow pump
3. A cylindrical tank with a radius of 5 ft. is filled to a depth of 10 ft. with water. Approximately how many gallons of water does it contain?
 - a. 2375 gal.
 - b. 3478 gal.
 - c. 4890 gal.
 - d. 5888 gal.
4. All chlorine cylinders are required to contain at least one fusible metal safety plug designed to melt between
 - a. 100-125 degrees F
 - b. 158-165 degrees F
 - c. 100-120 degrees F
 - d. 200-212 degrees F
5. If, in setting up a sample for the BOD test, an air bubble remains in the bottle,
 - a. the results of the test would still be accurate since the air would not be available to the aerobic organisms
 - b. the results of the test would still

be accurate because the manganous sulfate is only acted upon by anaerobic organisms

- c. the test is worthless
- d. a correction must be made to account for the difference in the volume of water involved

ANSWERS

1. $300,000 \text{ gal/day} \times 8.34 \text{ lbs/gal} \times 2/1,000,000 = 5 \text{ lbs/day}$

$$5 \text{ lbs/day} \times 30 \text{ days} = 150 \text{ lbs}$$

2. a

3. $V = \pi r^2 \times \text{Depth}$

$$= 3.14(5 \text{ ft.})^2 \times 10 \text{ ft.}$$

$$= 785 \text{ cu. ft.}$$

$$785 \text{ cu. ft.} \times 7.5 \text{ gal/cu.ft.} = 5888 \text{ gal}$$

4. b

5. c

Water Quality Bureau
Department of Health
& Environmental Sciences
Capitol Station
Helena, Montana 59601

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TO:

1,500 copies of this publication were produced at a unit cost of 33½¢ per copy, for a total cost of \$507.71 which includes \$384.65 for printing and \$123.06 for distribution